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Atty. Dkt. No. 047182-0139

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicant: Seamus CURRAN et al.

Title: NANOTUBE BASED NON-LINEAR OPTICS  
AND METHODS OF MAKING SAME

Appl. No.: 10/537,942

International 12/9/2003

Filing Date:

371(c) Date:

Examiner: Unassigned

Art Unit: Unassigned

Conf. No.: 1393

**INFORMATION DISCLOSURE STATEMENT**  
**UNDER 37 CFR §1.56**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

Submitted herewith on Form PTO/SB/08 is a listing of documents known to Applicants in order to comply with Applicants' duty of disclosure pursuant to 37 CFR §1.56.

A copy of each non-U.S. patent document and each non-patent document is being submitted to comply with the provisions of 37 CFR §1.97 and §1.98.

The submission of any document herewith, which is not a statutory bar, is not intended as an admission that such document constitutes prior art against the claims of the present application or that such document is considered material to patentability as defined in 37 CFR §1.56(b). Applicants do not waive any rights to take any action which would be appropriate to antedate or otherwise remove as a competent reference any document which is determined to be a *prima facie* art reference against the claims of the present application.

**TIMING OF THE DISCLOSURE**

The listed documents are being submitted in compliance with 37 CFR §1.97(b), before the mailing date of the first Office Action on the merits.

**RELEVANCE OF EACH DOCUMENT**

Document B4 is the English equivalent of Document B13. English abstracts are provided for non-English patent Documents B13, B16 and B17.

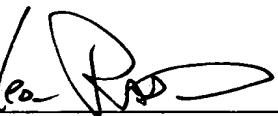
An English translation of Document B30 is not readily available. However, the absence of such translation does not relieve the PTO from its duty to consider the submitted foreign language documents (37 CFR §1.98 and MPEP §609).

Applicants respectfully request that each listed document be considered by the Examiner and be made of record in the present application and that an initialed copy of Form PTO/SB/08 be returned in accordance with MPEP §609.

Although Applicant believes that no fee is required for this Request, the Commissioner is hereby authorized to charge any additional fees which may be required for this Request to Deposit Account No. 19-0741.

Respectfully submitted,

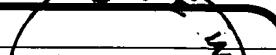
Date 3/5/07

By 

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Registration No. 43,445

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Date Submitted: March 5, 2007			
(use as many sheets as necessary)			
<b>Complete if Known</b> 			
Sheet	1	of	7
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Filing Date 12/9/2003			
First Named Inventor Seamus CURRAN			
Art Unit Unassigned			
Examiner Name Unassigned			
Attorney Docket Number 047182-0139			

## **U.S. PATENT DOCUMENTS**

Examiner Initials*	Cite No. <sup>1</sup>	Document Number	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number-Kind Code <sup>2</sup> (if known)			
	B1	2002/0176650 A1	11/28/2002	Zhao et al.	
	B2	2006/0272701 A1	12/07/2006	Ajayan et al.	
	B3	4,985,528	01/15/1991	Mignani et al.	
	B4	5,075,409	12/24/1991	Barthelemy et al.	
	B5	5,089,982 A	02/18/1992	Gran et al.	
	B6	5,231,140 A	07/27/1993	Kilburg et al.	
	B7	5,266,651 A	11/30/1993	Foss et al.	
	B8	5,290,824 A	03/01/1994	Mandal et al.	
	B9	5,294,463 A	03/15/1994	LeBarny et al.	
	B10	5,332,520 A	07/26/1994	Bach et al.	
	B11	5,384,378 A	01/24/1995	Etzbach et al.	
	B12	5,393,644 A	02/28/1995	Etzbach et al.	

## **FOREIGN PATENT DOCUMENTS**

Examiner Initials*	Cite No. <sup>1</sup>	Foreign Patent Document	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Documents	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T <sup>6</sup>
		Country Code <sup>3</sup> -Number <sup>4</sup> -Kind Code <sup>5</sup> (if known)				
	B13	EP 401 063 B1	12/05/1990	Rhone Poulenc Chimie		A
	B14	EP 422 500 A2	04/17/1991	The B.F. Goodrich Company		
	B15	EP 445 864 B1	09/11/1991	Akzo Nobel N.V.		
	B16	EP 524 865 B1	01/27/1993	Alcatel NV		A
	B17	FR 2 630 744 A1	11/03/1989	Thomson CSF		A
	B18	GB 2 246 138 A	01/22/1992	GEC Marconi Limited		

## **NON PATENT LITERATURE DOCUMENTS**

Examiner Initials*	Cite No. <sup>1</sup>	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.) date, page(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>6</sup>
	B19	Al-Jishi et al., "Lattice-dynamical model for graphite," Phys. Rev. B, October 15, 1982, 26(8), 4514-4522.	
	B20	Alvarez et al., "Excitation energy dependence of the Raman spectrum of single-walled carbon nanotubes," Chem. Phys. Lett., April 14, 2000, 320, 441-447.	
	B21	Antonov et al., "Subband Population in a Single-Wall Carbon Nanotube Diode, Phys. Rev. Lett., October 18, 1999, 83(16), 3274-3276.	

<b>Examiner Signature</b>		<b>Date Considered</b>	
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				<b>Art Unit</b>	Unassigned
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	B22	Azamian et al., "Directly observed covalent coupling of quantum dots to single-wall carbon nanotubes," Chem. Comm., 2002, 366-367.	
	B23	Bachtold et al., "Logic Circuits with Carbon Nanotube Transistors," Science, November 9, 2001, 294, 1317-1320.	
	B24	Banerjee et al., "Structural Characterization, Optical Properties, and Improved Solubility of Carbon Nanotubes Functionalized with Wilkinson's Catalyst," Am. Chem. Soc. 2002, 124, 8940-8948.	
	B25	Banerjee et al., "Synthesis and Characterization of Carbon Nanotube-Nanocrystal Heterostructures," Nano Lett., 2002, 2(3), 195-200.	
	B26	Banerjee et al., "Functionalization of Carbon Nanotubes with a Metal-Containing Molecular Complex," Nano Lett., 2002, 2(1), 49-53.	
	B27	Beaman, R.G., "Anionic Chain Polymerization," J. Am. Chem. Soc., September 1948, 70, 3115-3118.	
	B28	Biro, L.P., "Atomic Force Microscopy Investigation of Carbon Nanotubes," Carbon Filaments and Nanotubes: Common Origins, Differing Applications, NATO Science Series, Series E: Applied Sciences (Plenum, New York, 2001), 372, 255-263.	
	B29	Boul et al., "Reversible sidewall functionalization of buckytubes," Chem. Phys. Lett., September 3, 1999, 310, 367-372.	
	B30	Boyer et al., "Etude spectrographique des modifications de resonance provoquées par l'adsorption," Chem. Phys., January 26, 1960, 57, 381-392.	
	B31	Chakrapani et al., "Spectral fingerprinting of structural defects in plasma-treated carbon nanotubes," Mater. Res., October 2003, 18(10), 2515-2521.	
	B32	Chen et al., "Dissolution of Full-Length Single-Walled Carbon Nanotubes," J. Phys. Chem. B, 2001, 105, 2525-2528.	
	B33	Chen et al., "Solution Properties of Single-Walled Carbon Nanotubes," Science, October 2, 1998, 282, 95-98.	
	B34	Curran et al., "A Composite from Poly(m-phenylenevinylene-co-2,5-dioxy-p-phenylenevinylene) and Carbon Nanotubes: A Novel Material for Molecular Optoelectrics," Adv. Mater. (Weinheim, Ger.), 1998, 10(14), 1091-1093.	
	B35	Curran et al., "Functionalization of carbon nanotubes using phenoxyfranin," J. Chem. Phys., March 8, 2004, 120(10), 4886-4889.	

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	B36	Curran et al., "Evolution and Evaluation of the Polymer/Nanotube Composite," Synthetic Met. 1999, 103, 2559-2562.	
	B37	De Heer et al., "A Carbon Nanotube Field-Emission Electron Source," Science, November 17, 1995, 270, 1179-1180.	
	B38	Decossas et al., "Interaction forces between carbon nanotubes and an AFM tip," Europhys. Lett., March 15, 2001, 53(6), 742-748.	
	B39	Derycke et al., "Carbon Nanotube Inter- and Intramolecular Logic Gates," Nano Lett., September 9, 2001, 1(9), 453-456.	
	B40	Ederle et al., "Carbanions on Grafted C <sub>60</sub> as Initiators for Anionic Polymerization," Macromolecules, 1997, 30, 4262-4267.	
	B41	Eklund et al., "Vibrational modes of carbon nanotubes; spectroscopy and theory," Carbon, 1995, 33(7), 959-972.	
	B42	Ellis et al., "Hydrophobic Anchoring of Monolayer-Protected Gold Nanoclusters to Carbon Nanotubes," Nano Lett. 2003, 3(3), 279-282.	
	B43	Ferrari, A.C., "Determination of bonding in diamond-like carbon by Raman spectroscopy," Diamond Relat. Mater., 2002, 11, 1053-1061.	
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	B45	Georgakilas et al., "Organic Functionalization of Carbon Nanotubes," Am. Chem. Soc., January 8, 2002, 124(5), 760-761.	
	B46	Gopidas et al., "Photophysics and photochemistry of phenosafranin dye in aqueous and acetonitrile solutions," Photochem. Photobiol. A: Chem., 1989, 48, 291-301.	
	B47	Haremza et al., "Attachment of Single CdSe Nanocrystals to Individual Single-Walled Carbon Nanotubes," Nano Lett., 2002, 2(11), 1253-1258.	
	B48	Hill et al., "Functionalization of Carbon Nanotubes with Polystyrene," Macromolecules, 2002, 35, 9466-9471.	
	B49	Hirsch et al., "Functionalization of Single-Walled Carbon Nanotubes," Angew. Chem., Int. Ed., 2002, 41(11), 1853-1859.	

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	B50	Holzinger et al., "Sidewall Functionalization of Carbon Nanotubes," Angew. Chem., Int. Ed., 2001, 40(21), 4002-4005.	
	B51	Hornbaker et al., "Mapping the One-Dimensional Electronic States of Nanotube Peapod Structures," Science, February 1, 2002, 295, 828-831.	
	B52	Hubler et al., "Scanning probe microscopy of carbon nanotubes," Carbon, 1998, 36(5-6), 697-700.	
	B53	Jana et al., "Photoelectrochemical and spectral studies of phenoxyfran in different reducing agents," Chem. Phys. Lett., May 4, 1990, 168(3,4), 365-370.	
	B54	Jiang et al., "Selective Attachment of Gold Nanoparticles to Nitrogen-Doped Carbon Nanotubes," Nano Lett., March 2003, 3(3), 275-277.	
	B55	Jin et al., "Nonlinear optical properties of some polymer/multi-walled carbon nanotube composites," Chem. Phys. Lett., March 3, 2000, 318, 505-510.	
	B56	Kawashima et al., "Fundamentals, overtones, and combinations in the Raman spectrum of graphite," Phys. Rev. B, October 1, 1995, 52(14), 10053-10059.	
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	B58	Kulakovich et al., "Enhanced Luminescence of CdSe Quantum Dots on Gold Colloids," Nano Lett., 2002, 2(12), 1449-1452.	
	B59	Lee et al., "Electronic properties of metallic nanoclusters on semiconductor surfaces: Implications for nanoelectronic device applications," J. Nanoparticle Res., 2000, 2, 345-362.	
	B60	Li et al., "Self-organized Ribbons of Aligned Carbon Nanotubes," Chem. Mater., 2002, 14, 483-485.	
	B61	Liu et al., "All-Optical Flip-Flop Memory by Using two coupled Polarization Switches," Proc. Symp. IEEE/LEOS Benelux Chapter (Amsterdam), 2002, 199-202.	
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	B63	Lordi et al., "Method for Supporting Platinum on Single-Walled Carbon Nanotubes for a Selective Hydrogenation Catalyst," Chem. Mater., 2001, 13, 733-737.	

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	B64	Mickelson et al., "Fluorination of single-wall carbon nanotubes," Chem. Phys. Lett., October 30, 1998, 296, 188-194.	
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	B69	Rao et al., "Evidence for charge transfer in doped carbon nanotube bundles from Raman scattering," Nature, July 17, 1997, 388, 257-259.	
	B70	Rinzler et al., "Large-scale purification of single-wall carbon nanotubes: process, product, and characterization," Appl. Phys. A, 1998, 67, 29-37.	
	B71	Roth et al., "Molecular rectifiers and transistors based on π-conjugated materials," Synth. Met., 1998, 94, 105-110.	
	B72	Rueckes et al., "Carbon Nanotube-Based Nonvolatile Random Access Memory for Molecular Computing," Science, July 7, 2000, 289, 94-97.	
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	B74	Saito et al., "Probing Phonon Dispersion Relations of Graphite by Double Resonance Raman Scattering," Phys. Rev. Lett., January 14, 2002, 88(2), 27401-1 to 27401-4.	
	B75	Samsonidze et al., "Phonon Trigonal Warping Effect in Graphite and Carbon Nanotubes," Phys. Rev. Lett., January 17, 2003, 90(2), 27403-1 to 27403-4.	
	B76	Sano et al., "Self-Organization of PEO-graft-Single-Walled Carbon Nanotubes in Solutions and Langmuir-Blodgett Films," Langmuir, August 21, 2001, 17(17), 5125-5128.	
	B77	Satishkumar et al., "The decoration of carbon nanotubes by metal nanoparticles," J. Phys. D: Appl. Phys., 1996, 29, 3173-3176.	

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Date Submitted: March 5, 2007 <i>(use as many sheets as necessary)</i>				<b>Filing Date</b>	12/9/2003
				<b>First Named Inventor</b>	Seamus CURRAN
				<b>Art Unit</b>	Unassigned
				<b>Examiner Name</b>	Unassigned
Sheet	6	of	7	<b>Attorney Docket Number</b>	047182-0139

**NON PATENT LITERATURE DOCUMENTS**

Examiner Initials*	Cite No. <sup>1</sup>	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.) date, page(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>6</sup>
	B78	Schiffrin, David J., "Capped Nanoparticles as Potential Electronic Components with Nanoscale Dimensions," MRS Bulletin, December 2001, 1015-1019.	
	B79	Shaffer et al., "Polystyrene grafted multi-walled carbon nanotubes," Chem. Commun., 2002, 18, 2074-2075.	
	B80	Sun et al., "High Dissolution and Strong Light Emission of Carbon Nanotubes in Aromatic Amine Solvents," J. Am. Chem. Soc., 2001, 123, 5348-5349.	
	B81	Tan et al., "Temperature-dependent Raman spectra and anomalous Raman phenomenon of highly oriented pyrolytic graphite," Phys. Rev. B, September 1, 1998, 58(9), 5435-5439.	
	B82	Tan et al., "Polarization properties, high-order Raman spectra, and frequency asymmetry between Stokes and anti-Stokes scattering of Raman modes in a graphite whisker," Phys. Rev. B 2001, 64, 214301-1 to 214301-12.	
	B83	Tan et al., "Resonantly enhanced Raman scattering and high-order Raman spectra of single-walled carbon nanotubes," Appl. Phys. Lett., September 13, 1999, 75(11), 1524-1526.	
	B84	Tans et al., "Room-temperature transistor based on a single carbon nanotube," Nature, May 7, 1998, 393, 49-52.	
	B85	Thomsen et al., "Double Resonant Raman Scattering in Graphite," Phys. Rev. Lett., December 11, 2000, 85(24), 5214-5217.	
	B86	Treacy et al., "Exceptionally high Young's modulus observed for individual carbon nanotubes," Nature, June 20, 1996, 381, 678-680.	
	B87	Tsang et al., "The structure of the carbon nanotube and its surface topography probed by transmission electron microscopy and atomic force microscopy," Chem. Phys. Lett., February 9, 1996, 249, 413-422.	
	B88	Viswanathan et al., "Single-Step In Situ Synthesis of Polymer-Grafted Single-Wall Nanotube Composites," J. Am. Chem. Soc., July 11, 2003, 125, 9258-9259.	
	B89	Wei, Chenyu, "Thermal Expansion and Diffusion Coefficients of Carbon Nanotube-Polymer Composites," Nano Lett., 2002, 2(6), 647-650.	
	B90	Wilson et al., "New developments in the formation of nanotubes from coal," J. Fuel, 2002, 81, 5-14.	

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